November 2010 Climate Summary for Southwest Lower Michigan

Nathan Jeruzal
National Weather Service Grand Rapids, MI

Overview

November 2010 for Southwest Lower Michigan can be summarized as a warm and slightly dry month. A good portion of the month saw temperatures much above normal with intervals of mainly light precipitation.

Overall, average temperatures for the month ranged from two to as much as four degrees F above normal. This warmth resulted from the westerly to southwesterly jet stream pattern across the region for a good portion of the month. Above normal temperatures occurred from the 7th through the 23rd and also on last two days of the month. Many warm temperature records were broken on the 22nd, the warmest day of the month. A couple of slightly cooler than normal periods occurred. One occurred during the first 6 days of the month, and another occurred from the 26th through the 28th.

Precipitation across the area was generally below normal for the month. Precipitation ranged from near normal to almost 2 inches below normal. The wettest weather was found across the southern third portion of the area. Much of the month was somewhat dry with a couple of days that saw decent amounts of rain that help to make up for the deficit. Weak frontal systems moved through every few days with some light rainfall. This light rainfall did not add up to much overall. Three bigger systems that came through on the 22nd, 24th/25th, and 29th/30th all brought greater rainfall amounts to the area and resulted in monthly totals closer to average.

Snowfall was well below normal. The entire area saw less than an inch of snow for the month, with most locations only seeing a trace of snow. The highest snow amounts of a few tenths of an inch fell across the higher elevations of the north sections of the area on the morning of the 5th. Otherwise, the warm temperatures kept all precipitation in the form of rainfall.

November 2010 was relatively sunny with almost 40% of possible sunshine recorded at Grand Rapids. The average amount of sunshine for November is around 28%. The abundance of sunshine can be attributed to the lack of typical lake effect clouds with the warmer pattern that was in place. November is the third cloudiest month, trailing only December (cloudiest) and January (second cloudiest), respectively.

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Table 1. Average temperature and precipitation / snowfall totals for November 2010 at the primary climate stations. Normals are computed from the 1971-2000 30-year average.

Location		Average Temperature (degrees F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	*Reported*	**41.8**	**2.81**	**0.1**
	Normal	**38.4**	**3.35**	**7.7**
	Departure	**+3.4**	**-0.54**	**-7.6**
	Record Max Avg (year)	**47.6 (1931)**		
	Record Min Avg (year)	**31.0 (1951)**		
	Record Max (year)	**81 (1950)**	**7.90 (2003)**	**26.9 (1967)**
	Record Min (year)	**-10 (1950)**	**0.06 (1904)**	**0.0**
Lansing	*Reported*	**40.6**	**2.08**	**Trace**
	Normal	**38.0**	**2.66**	**5.1**
	Departure	**+ 2.6**	**-0.58**	**-5.1**
	Record Max Avg (year)	**45.6 (1931)**		
	Record Min Avg (year)	**27.3 (1869)**		
	Record Max (year)	**79 (1950)**	**5.62 (2003)**	**21.8 (1865)**
	Record Min (year)	**-5 (1949)**	**0.04 (1904)**	**0.0**
Muskegon	*Reported*	**42.6**	**1.46**	**Trace**
	Normal	**38.7**	**3.23**	**8.7**
	Departure	**+ 3.9**	**-1.77**	**-8.7**
	Record Max Avg (year)	**47.6 (1931)**		
	Record Min Avg (year)	**31.8 (1951)**		
	Record Max (year)	**76 (1930,1961)**	**6.77 (2005)**	**25.7 (1995)**
	Record Min (year)	**-14 (1950)**	**0.04 (1904)**	**0.0**

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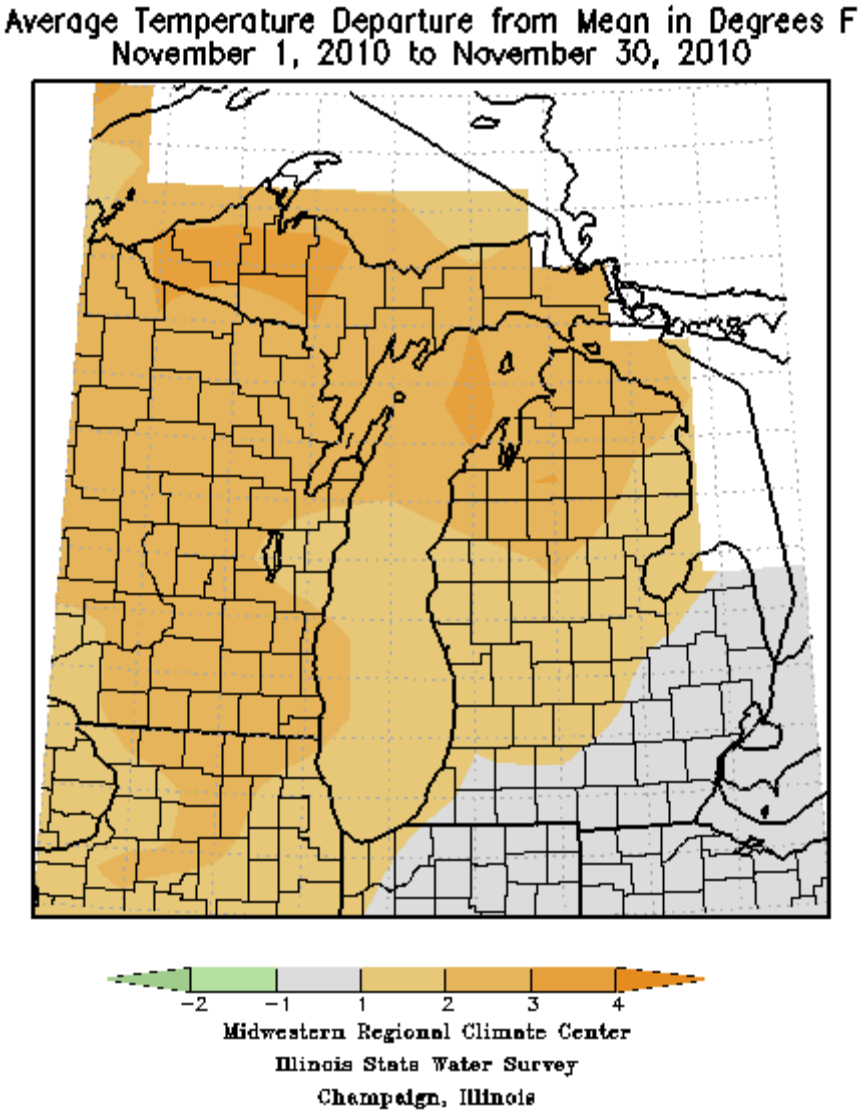

Figure 1. November 2010 average temperature departure from normal for the state of Michigan.

Temperatures:

Temperatures ranged from near to slightly above normal across the southeast portion of the area to as much as 3 to 4 degrees above normal across the northeast portion of the area. Most of the month saw average daily temperatures above normal. The only periods with below normal average daily temperatures were the first five days of the month, and a five day period centered around Thanksgiving on the 25th.

The month started off below normal as a cool air mass from Canada had moved in across the area. This air mass resided across the area for the first five days of the month.

This Canadian air mass gradually modified and lifted out of the area by the 7th as west to southwest winds took control of the area. Temperatures continued to warm to much above normal levels, especially daytime highs. High temperatures climbed well into the 60s across

much of the area through the 12th. The increasingly long nights allowed low temperatures to fall well into the 30s and 20s.

A cold front then moved through the area, bringing an end to the much above normal temperatures. The air mass behind this cold front was not all that cold as temperatures cooled off to around or slightly above normal for the period from the 14th through the 20th. A much stronger system then moved into the area on the 21st through the 23rd, bringing warm and moist air to the region. This resulted in high temperatures in the 60s once again on the 22nd, with lows only in the 50s. The lows in the 50s actually set record high minimums for the date.

Yet another strong system moved through the area centered around Thanksgiving Day on the 25th. Temperatures ahead of this system were not quite as warm, but still above normal. Temperatures dropped significantly across the area then for the weekend immediately following Thanksgiving behind the strong system. Temperatures fell to below normal levels for most of the rest of the month.

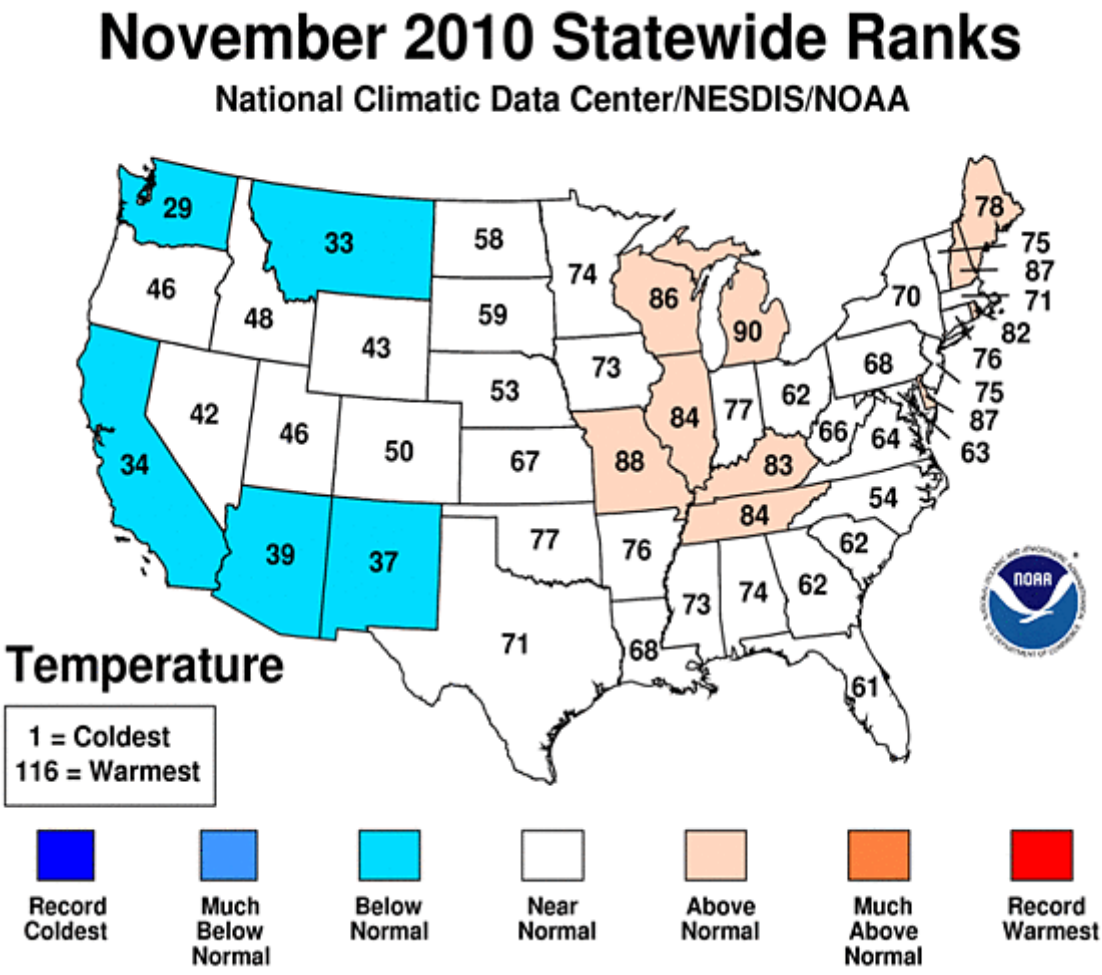

Figure 2. National Climate Data Center ranking state temperature ranking for November 2010.

Table 2. November 2010 temperature frequencies at the primary climate stations.

Number of days	Grand Rapids	Lansing	Muskegon
highs ≥ 60 (2010)	6	6	6
highs ≥ 60 (2009)	4	4	3
highs ≥ 60 (normal)	3.8	3.6	2.5
highs ≥ 60 (record)	14	14	14
year(s) of record	1975	1975	1975
highs ≤ 32 (2010)	0	0	0
highs ≤ 32 (2009)	0	0	0
highs ≤ 32 (normal)	2.6	3.2	2.1
highs ≤ 32 (record)	11	14	12
year(s) of record	1951	1951	1951
lows ≤ 32 (2010)	18	20	12
lows ≤ 32 (2009)	9	12	10
lows ≤ 32 (normal)	16.3	19.7	15.1
lows ≤ 32 (record)	26	30	26
year(s) of record	1995	1873, 1869	1995
lows ≤ 0 (2010)	0	0	0
lows ≤ 0 (2009)	0	0	0
lows ≤ 0 (normal)	0.0	0.1	0.0
lows ≤ 0 (record)	0	3	0
year(s) of record	-	1880	-

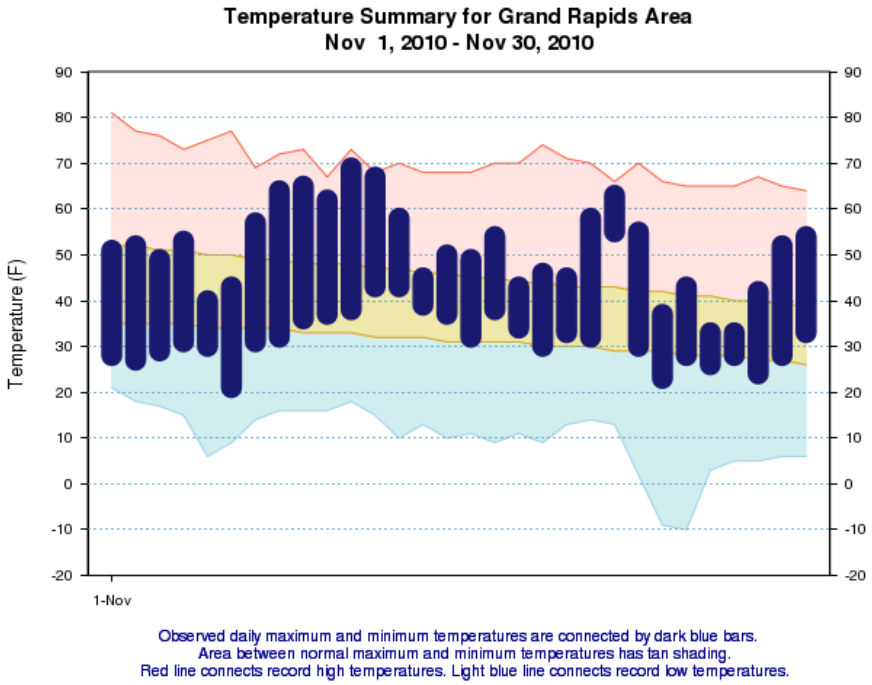

Figure 3. Observed temperatures at the Grand Rapids International Airport. Dark blue bars are the temperature range for each day. The yellow strip indicates the normal range of temperatures. Record high and low temperatures are indicated at the top of the pink area and the bottom of the blue area, respectively. Normals computed as in Figure 1.

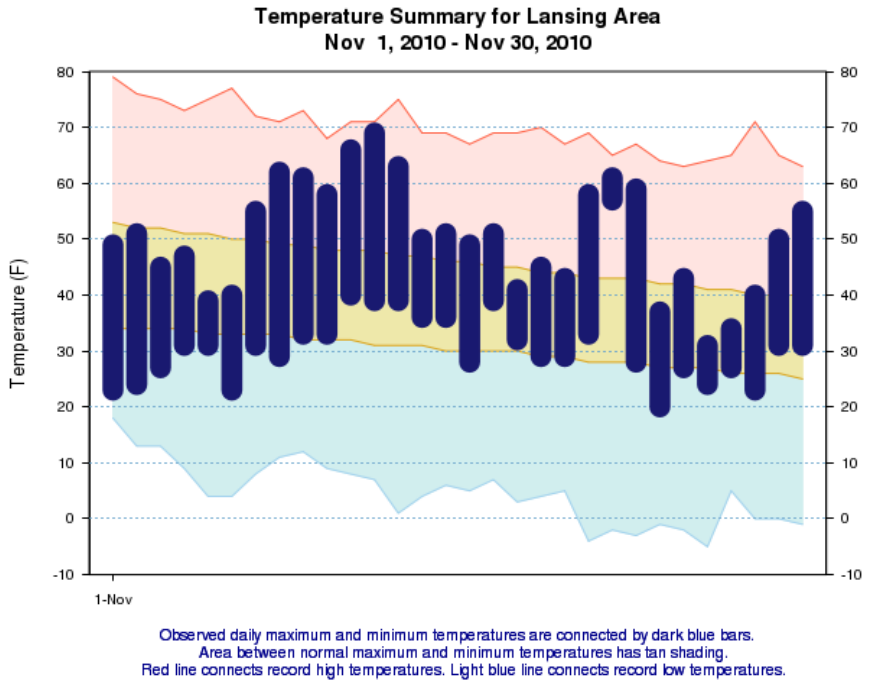

Figure 4. As in Figure 3, except for the Lansing/Capital City airport.

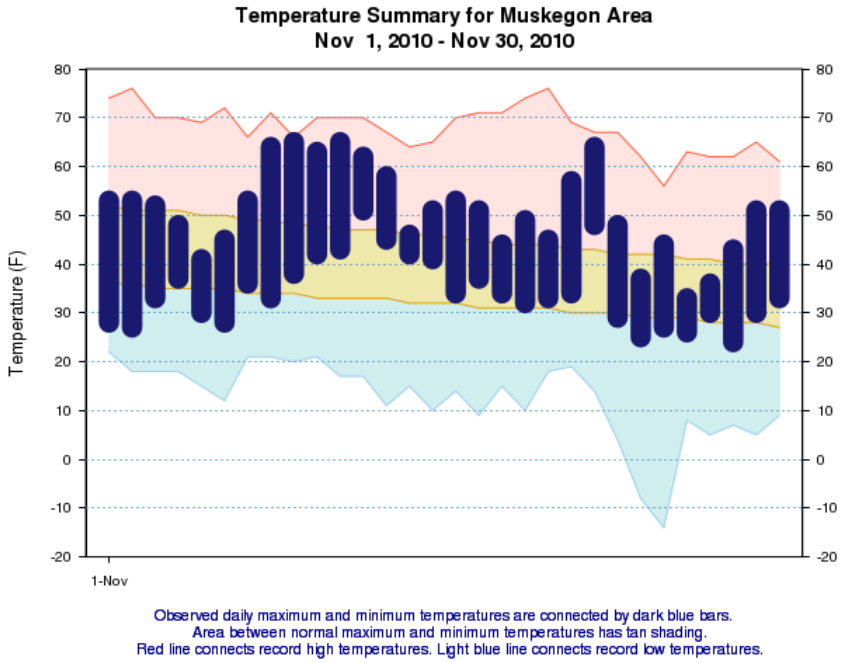

Figure 5. As in Figure 3, except for the Muskegon County airport.

Precipitation:

Precipitation was generally below normal across the area. The extreme southern portion of the area saw precipitation totals slightly above normal as waves of low pressure moved across the southern counties with each system.

Much of the month was on the dry side with high pressure in control and only weak and mostly dry systems moving through the area. Through the 21st of the month, most, if not all locations had less than an inch or rainfall/water equivalent for the month.

This dry trend came to an end on the 22nd as the first strong storm system in a series of three moved through the area. Many locations, especially southern locations, saw well over an inch of rainfall occur. Another strong system then approached the area the night before Thanksgiving, bringing another half an inch to an inch of rainfall to the area by Thanksgiving night. The third and final storm system in the series then moved across the area on the 29th and 30th. This brought yet another round of rainfall to the area, ranging from less than half an inch up north, to almost an inch down south. These three systems in the last ten days of the month nearly made up for the lack of rainfall for the first twenty days, especially down south.

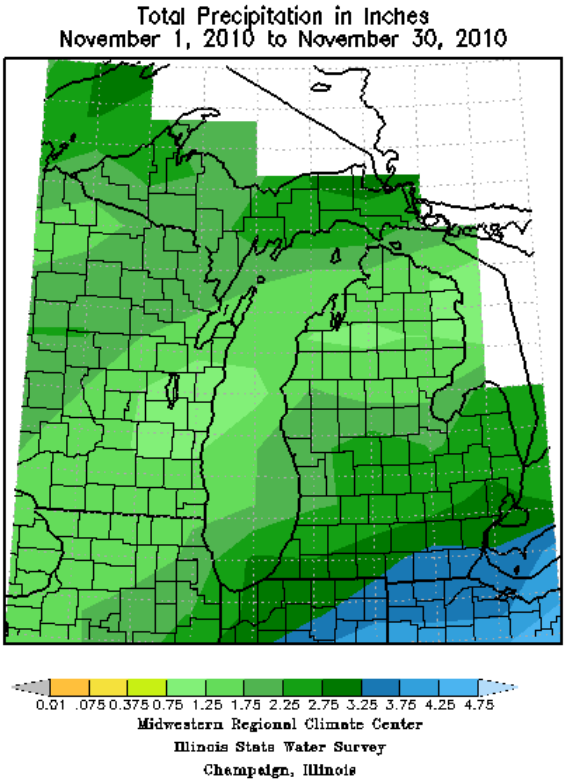

Figure 6. Total precipitation for Michigan during November 2010.

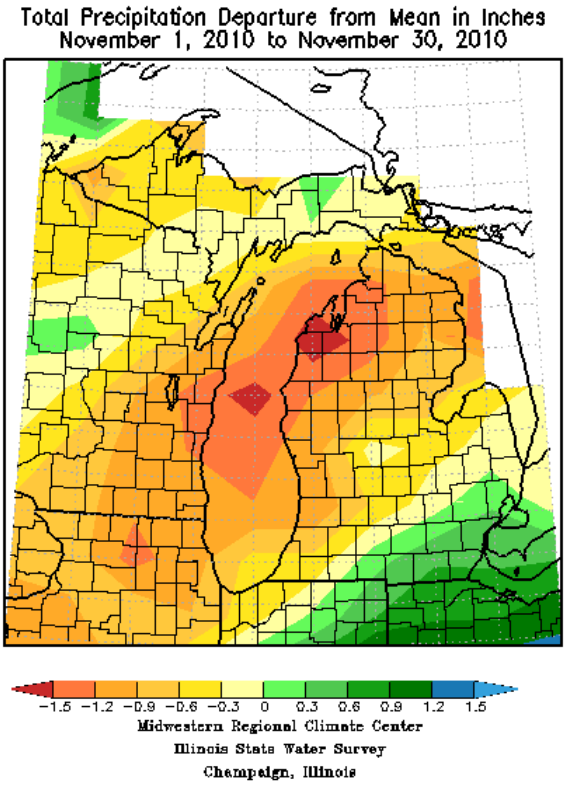

Figure 7. Precipitation departure from normal for Michigan during November 2010.

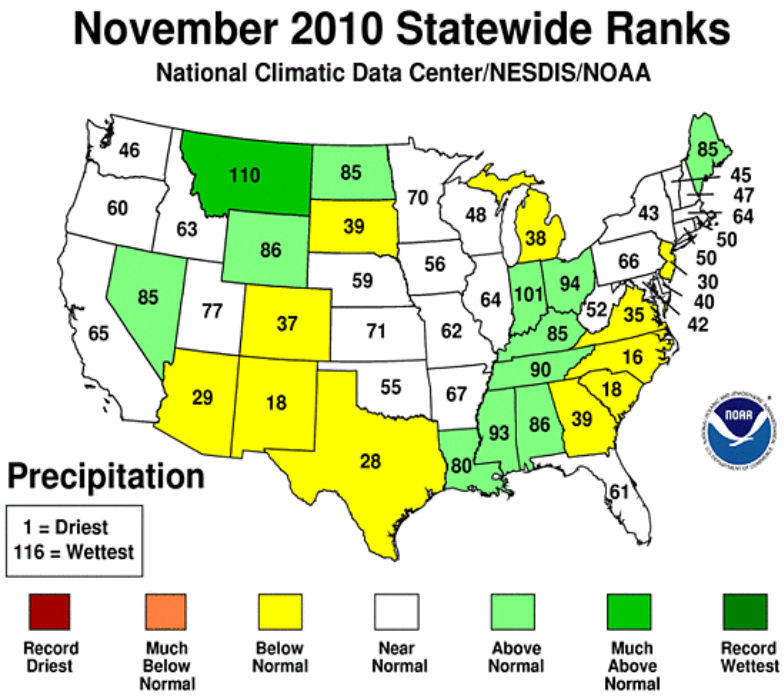

Figure 8. National Climate Data Center state precipitation ranking for November 2010.

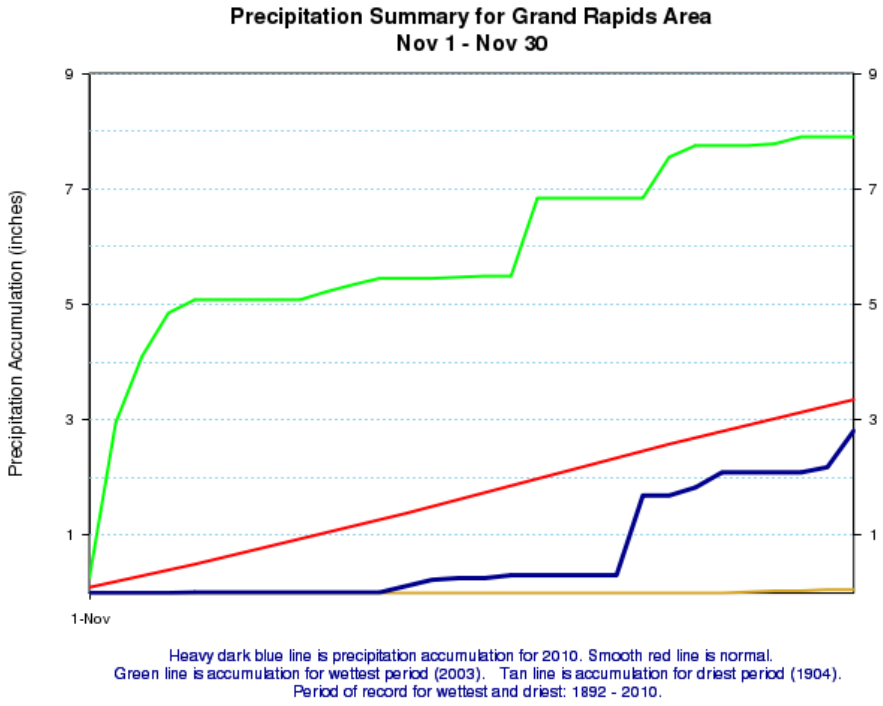

Figure 9. Daily precipitation in inches for November 2010 at the G.R. Ford International Airport.

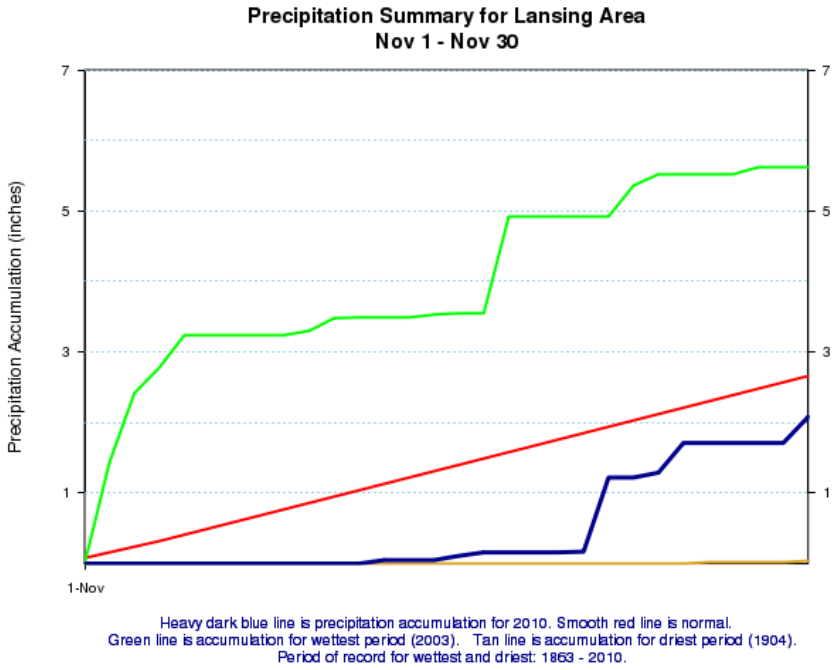

Figure 10. As in Figure 9, except for the Lansing Capital City Airport.

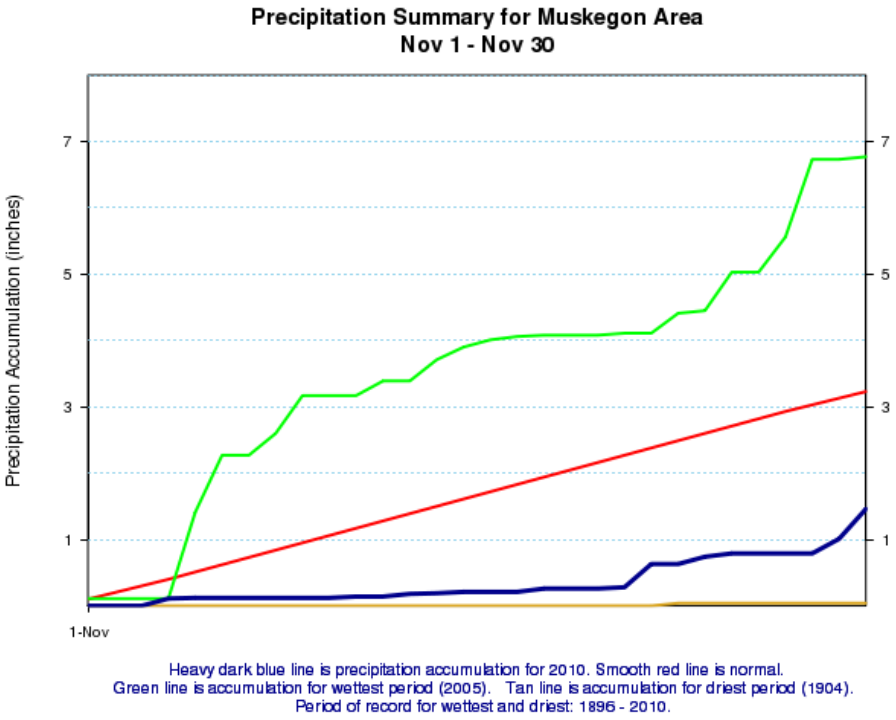

Figure 11. As in Figure 7, except for the Muskegon County Airport

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Highlights of the month of November 2010

1st – 2nd

Canadian high pressure settled in across the area and brought cool weather to the state.

3rd - 4th

A couple of fronts moved through the area with only small amounts of rainfall. Much cooler weather followed in the wake of the fronts.

5th – 6th

The coldest weather of the season up to those dates moved in across the area. Some lake effect snow showers occurred, with mainly trace amounts recorded. Some locations at higher elevations up north saw up to an inch of snow.

7th – 12th

Southerly winds developed across the area, helping to bring much warmer temperatures up and across the area. Temperatures warmed to well above normal, with 60s by the 8th. This continued through the 12th.

13th – 14th

A system tracked northeast across the area. This brought some rainfall to the area on the 13th. Cooler air moved in then on the 14th, ending the extended period of highs in the 60s.

15th – 18th

A couple of systems brushed the area with some lighter rainfall. One moved by to the southeast late on the 16th and early on the 17th. This system brought a few hundredths of an inch of rainfall to the area. A cold front then came in on the 18th from the northwest with trace amounts to a few hundredths of an inch of rainfall. Seasonably mild weather remained in place for the middle of November.

19th - 23rd

A frontal system moved into the area initially on the 19th. Waves of low pressure moved along this front, bringing occasional light rainfall to the area. The last wave in the series on the 22nd pulled up some very warm air, and some record high minimum (lows) temperatures were set. In addition, the last wave on the 22nd brought up to two inches of rain to the area (Figure 12). The highest amounts were across the south toward Interstate 94.

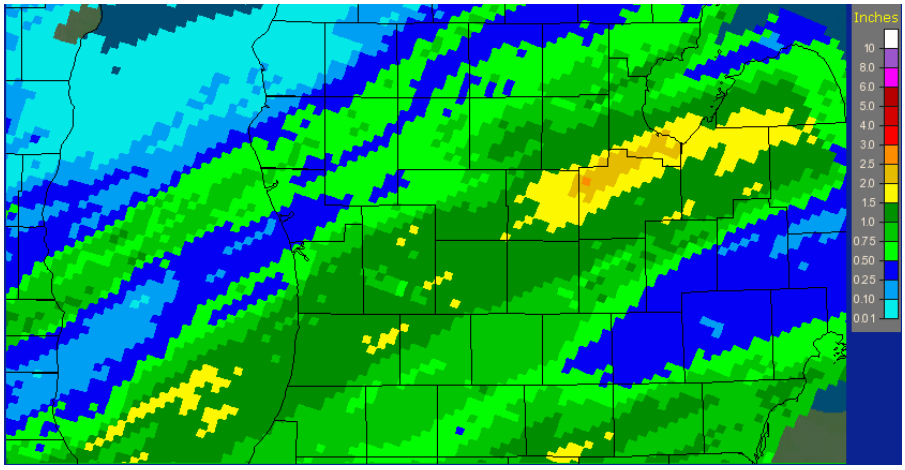

Figure 12. Observed rainfall for November 22nd, 2010

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24th - 25th

The next system moved in across the area late in the day the day before Thanksgiving. Rain and sleet developed across the area during the very late afternoon and evening hours. Precipitation changed over to all rain by Thanksgiving morning as temperatures warmed overnight. Occasional rain showers continued into Thanksgiving evening before a very strong cold front moved through the area. Rain changed over to a little snow just before precipitation ended Thanksgiving evening.

26th - 28th

Much colder weather moved in behind the front that moved through on Thanksgiving/the 25th. Some light lake effect snow showers occurred with only a dusting of snow at some locations.

29th - 30th

Southerly winds picked up once again ahead of yet another stronger system moving through the region. More rainfall occurred ahead of the system late on the 29th and on the 30.th (Figure 13). This rainfall actually brought some locations down south above normal for precipitation after being below normal most of the month.

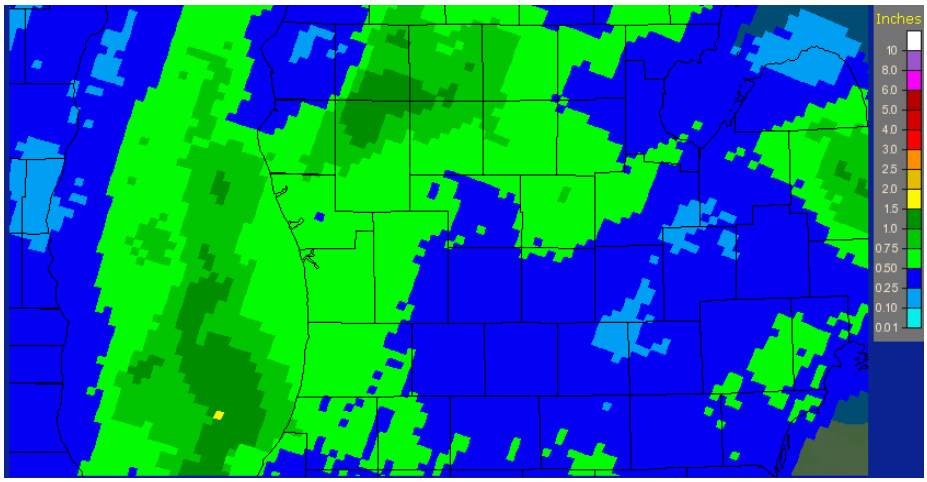

Figure 13. Observed rainfall for November 30th, 2010